ORIGINAL RESEARCH PAPER

Volume - 11 | Issue - 09 | September - 2022 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

THE ELECTROCARDIOGRAPHIC CHANGES IN SMOKERS AND NON SMOKERS IN RURAL POPULATION: A COMPARATIVE STUDY.

Physiology

Dr. O P Rai	MKCH & TC Kanpur Nagar
Dr. Raj Kishor Vishwakarma*	MKCH & TC Kanpur Nagar *Corresponding Author
Dr. Arvind Sharma	Assist. Prof,(Dep of PMR) AIIMS, Raibarelly

ABSTRACT

Introduction: According to World Health Report (2002) any type of tobacco smoking is the most preventable cause of overall morbidity as well as cardiovascular mortality worldwide. Cigarette smoking has long been proved as a causative factor for CAD (coronary artery disease) so present study aims to evaluate the Electrocardiographic status in smokers and chewers of tobacco, to have a comparative analysis of their ECG status with non tobacco users not smoking or chewing. **Objective:** The objective is to find if smoking or chewing tobacco produce any ECG changes. **Methodology:** Two groups was taken, 77 cases and 300 controls, 12 lead ECG record was taken and BP of each subject was recorded. ECG interval of cases and controls was evaluated if any change is found. **Results:** There was significant increase in mean BP of smokers was found as compared to non smokers. There was significant prolongation of mean duration of P wave and QRS complex in smokers and chewers was found as compared to control. **Conclusion:** ECG changes in smokers demonstrates only significant increase in mean P wave and QRS interval and so overall total duration of cardiac electrical wave was found to be affected by smoking. So this was concluded that any type of smoking is injurious to cardiovascular health

KEYWORDS

ECG, BP, Smoker, cardiac vascular disease.

INTRODUCTION

According to the World Health Report (2002)[1] Cigarette smoking increases the relative risk of coronary artery disease by 2.8-fold and 3.1-fold in young (35–64 years) men and women, respectively.[2] Smoking has acute deleterious effects on the blood pressure and sympathetic tone, and it reduces the myocardial oxygen supply. Smoking is associated with increased ventricular premature beats, and it is a strong risk factor for sudden cardiac death.[3] Compared to nonsmokers, smokers have increased incidence of coronary spasm and a reduced threshold for ventricular arrhythmias.[4-6]

Tobacco is the most preventable cause of overall morbidity as well as cardiovascular morbidity worldwide. The consumption of nicotine in tobacco is the single biggest avoidable cause of death and disability. Tobacco usage is considered one of the biggest public health hazards the world has ever faced, killing nearly six million people a year.[7] More than five million of these deaths are attributable to direct tobacco use while more than 0.6 million are attributable to non-smokers being exposed to passive smoke. Approximately one person dies every six seconds due to tobacco use in some form, accounting for one in 10 adult deaths. Up to half of current tobacco users will eventually dies of a tobacco-related disease.[8]

Tobacco use can lead to heart attack, chronic obstructive pulmonary disease, cancer, peripheral vascular disease, hypertension and so on.[9] Recording of ECG is one of the simplest methods of assessing cardiovascular dysfunction.[10] An ECG is simply a representation of the electrical activity of the heart muscle as it changes with time. Smoking is a well-established risk factor for ischemic stroke and myocardial infarction.[11] Smoking has varied effects on the cardiovascular system. The quality, quantity, duration and frequency of smoking play an important role in determining how much smoking is harmful to the cardiovascular system.[12] Given the importance of adverse effects of smoking, the present study has been undertaken to see ECG changes in male smokers, who are otherwise healthy as compared to non smokers.

MATERIAL AND METHODS

The aim of the study is to evaluate, change in different cardiac electrical parameters with the help of ECG in smokers. The study is a cross sectional comparative study between smokers and non smokers.

The study was carried out in the department physiology, UPUMS, SAIFAI, ETAWAH, UTTAR PRADESH, for a period of February 2019 to July 2020, with the permission of ethical committee. A total 77 prehypertensive smokers (BP = 120-139/80-89mmHg, JNC VII criteria), apparently healthy male and female between age 20-45 years and 300 Non smoker of same age group as for cases, selected from general population and medicine outpatient department. The nature and purpose of study was explained to each subject and informed consent was obtained from those willing to participate in the study.

A detailed history of each subject was taken. Thorough general, physical and systemic examination was carried out to rule out any clinically apparent disease. After proper preparation of each subject, blood pressure was recorded in resting supine position, with the help of Stethoscope and manual sphygmomanometer. Electrocardiogram of each subject was recorded in resting supine position by using Clarity ECG: CMECG-01, Clarity Medical Private Limited. It is computer based automatic 12 lead ECG machine. The ECG recorded was evaluated for, Heart rate, P wave, PR interval, QRS complex, QRS axis, QT interval, QTc interval, ST segment, T wave etc.

Statistical Analysis

The data was entered on Microsoft excel 2016 and the result was expressed as Mean ± S.D. Data then analyzed by using IBM SPSS 2.0 statistical software. Smokers were compared with Non smokers. ANOVA single factor for two means was used for comparison between the groups and p value < 0.05 was considered as significant.

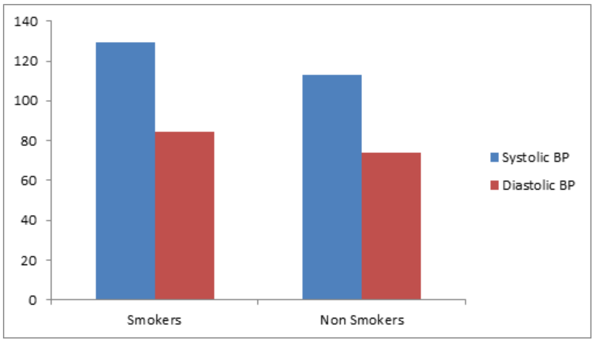
RESULT

The mean systolic blood pressure in smokers was 129.66 mmHg and Non smokers 113.28mmHg and the difference was found significant. Mean diastolic blood pressure in smokers was found 84.49mmHg and Non smokers 73.67mmHg, the difference was found significant. The mean HR in smokers was 86.05 per sec and in Non smokers 84.98 per sec, the difference was found not significant with p value 0.41. The mean P wave duration in smokers was 129.60msec and in Non smokers 125.05msec and the difference was found (P value 0.05) poorly significant. The mean PR interval in smokers was 160.81msec and in Non smokers 157.99msec, the difference was found (P value 0.29) insignificant. The mean QRS interval in smokers was 85.01msec and in non smokers 79.75msec and the difference was found (P value 0.004) highly significant. The mean QRS axis in smokers 38.95 and non smokers 40.16, difference was insignificant. The mean QT interval 358.13msec in smokers and in non smokers 348.23msec, the difference was insignificant. The mean QT_c interval 415.90msec in smokers and 404.93msec in non smokers, the difference was found insignificant. The mean ST segment interval in smokers 80.48msec and in non smokers was 79.18msec, the difference was insignificant. The mean T wave interval in smokers was 191.78 msec and in non smokers was 187.74msec, the difference was insignificant.

Table-1 Comparison of BP between smokers and Non smokers

Blood Pressure	Smokers	Non Smokers	P value
Systolic BP(mmHg)	129.66	113.28	0.00

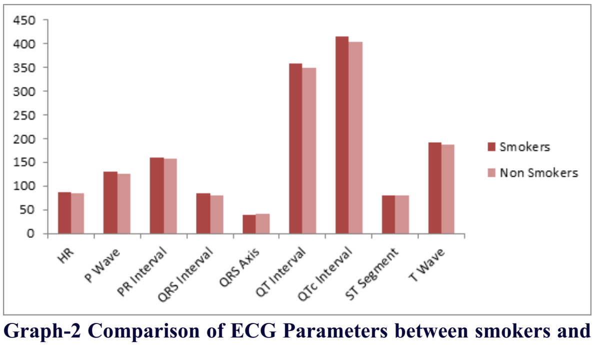
Diastolic BP(mmHg)	84.49	73.67	0.00



Graph-1 Comparison of BP between smokers and Non smokers

Table-2 Comparison of ECG Parameters between smokers and Non smokers

ECG Parameters	Smokers	Non Smokers	P value
HR	86.05±9.97	84.98±10.26	0.41
P Wave(msec)	129.60±22.69	125.01±16.78	0.05
PR Interval(msec)	160.81±23.78	157.99±19.77	0.29
QRS Interval(msec)	85.01±17.84	79.75±13.08	0.004
QRS Axis	38.95±32.42	40.16±29.82	0.75
QT Interval(msec)	358.13±58.93	348.23±43.60	0.1
QTc Interval(msec)	415.90±66.94	404.93±49.91	0.1
ST Segment (msec)	80.48±12.00	79.18±0.67	0.38
T Wave(mesec)	191.78±28.32	187.74±24.29	0.21



Graph-2 Comparison of ECG Parameters between smokers and Non smokers

DISCUSSION

Smoking has various kinds of effects on the cardiovascular system. The quantity, duration and frequency of smoking play an important role in the development of cardiovascular disease and complications and also complication in various organs of the body. In available literatures, it has been seen that smoking increased the heart rate.

It was found that in smokers there was a little decrease in the duration of P-R interval and QRS duration. But it was not statistically significant.[13] But in the present study the ECG result of smokers show statistically significant increase in blood pressure (systolic and diastolic), P wave duration, QRS interval as compared with non smokers. Cigarette smoking increases the velocity of conduction and shortens the effective refractory period at the AV node.[14] Smoking was associated with shorter QTC than non smokers.[15] but in the present study QTC interval is within normal limit. Smoking causes down sloping of ST segment in the subject, which predicts any kind of future coronary events.[16] other parameters such as heart rate, PR interval, ORS axis, OT interval, OTc interval, ST segment, T wave duration do not show any significant change in duration as compared to smokers by ANOVA single factor for two means.

CONCLUSION

The present study was conducted to assess the electrocardiographic changes in the cardiovascular system. The electrocardiographic results were evaluated for different parameters like heart rate, P-wave, P-R interval, QRS complex, QRS axis, QT interval, QTc interval, ST segment and T-wave. P wave and QRS duration shows a significant change for smokers. There is no significant change seen in P-R interval, QRS axis, QT interval, QTc interval, ST segment and T-wave among both groups. QRS complex is increased significantly in smokers compared to non smokers. T-P interval increase is seen in smokers, which may alter the heart rate.

The result from this study among non-smokers and smokers shows that smoking of even a single cigarette can potentially increase the risk of sudden cardiac death in all individuals. So it is the responsibility of our society and physicians to discourage smoking of even a single cigarette, in the whole community and discourage other type of smoking.

REFERENCES

1. World Health Report 2002 reducing risk, promoting healthy life Geneva World Health Organization2002, 47-98.
2. Prasad DS, Kabir Z, Dash AK, et al. Smoking and cardiovascular health: a review of the epidemiology, pathogenesis, prevention and control of tobacco. Indian J Med Sci 2009;63:520–33.
3. Ezzati M, Henley SJ, Thun MJ, et al. Role of smoking in global and regional cardiovascular mortality. Circulation 2005;112:489–97
4. Bazzano LA, He J, Muntner P, et al. Relationship between cigarette smoking and novel risk factors for cardiovascular disease in the United States. Ann Intern Med 2003;138:891–7.
5. Akishima S, Matsushita S, Sato F, et al. Cigarette-smoke-induced vasoconstriction of peripheral arteries: evaluation by synchrotron radiation microangiography. Circ J 2007;71:418–22.
6. Caralis DG, Deligonul U, Kern MJ, et al. Smoking is a risk factor for coronary spasm in young women. Circulation 1992;85:905–9.
7. Global Adult Tobacco Survey: India 2009-2010. Ministry of Health & Family Welfare, Govt. of India. Available from http:// mohfw.nic.in/ WriteReadData/ l892s/ 14556 18937 GATS%20India.pdf
8. Global Status Report on Non-communicable Diseases. WHO; April 2011. Available from: http://www.who.int/nmh/publications/ncd_report2010/en/
9. Health effects of cigarette smoking. Center for Disease Control and prevention. Available from: http:// www.cdc.gov/ tobacco/ data_statistics/ fact_sheets/ health_effects /effects_cig_smoking/
10. Minami J, Ishimitsu T, Matsuoka H. Effects of Smoking Cessation on Blood Pressure and Heart Rate Variability in Habitual Smokers. Hypertension. 1999; 33: 586-590.
11. Feigin L, Rinkel E, Lawes M. Risk factors for subarachnoid hemorrhage: An updated systematic review of epidemiological studies. Stroke. 2005; 36: 2773–2780.
12. Baden L, Weiss ST, Thomas HE Jr., Sparrow D. Smoking status and the electrocardiogram: a cross sectional & longitudinal study. Arch Environ Health. 1982; 37: 365-9.
13. Mujtaba A. "Effect of smoking on Electrocardiogram andblood pressure." IJPP 1977; 21 (4):393-395`
14. Honour C, Littler A. "Direct arterial pressure, heart rate ECG during cigarette smoking in unrestricted patients." Am H J 1975; 89: 18-25.
15. Ristola P, Viitasalo M. "QTC interval as cardiac risk factor in middle aged." 1997; 77: 543-548.
16. O'Connor et al. "Independent prognostic significance of ischemic ST segment response limited to recovery from tread mill exercise in asymptomatic subjects." Circulation June1998; 97: 2117-2122.